DOCUMENT RESUME

ED 275 602 SO 017 653

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TITLE Teaching Abstract Concepts in Sociology.
PUB DATE Oct 86
NOTE 19p.; An earlier version of this paper was presented at the Annual Meeting of the American Sociological Association (Detroit, MI, August 31-September 4, 1983).
PUB TYPE Reports - Research/Technical (143) -- Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Abstract Reasoning; *Cognitive Structures; Cognitive Tests; *Critical Thinking; Higher Education; Logical Thinking; Piagetian Theory; *Problem Solving; *Sociology
IDENTIFIERS Piaget (Jean); *Test of Logical Thinking (Tobin and Capie)

ABSTRACT

Students and instructors may be frustrated with students' lack of understanding of sociological concepts. We suggest that the difficulty of teaching and learning sociology is that sociological concepts and relationships require the use of abstract reasoning patterns. Many students are unaccustomed to using these abstract reasoning patterns. We use the Piagetian cognitive development theoretical rationale to discuss abstract thinking, offer a suggestion for measuring students level of abstract reasoning, and provide an instructional strategy to teach abstract concepts in sociology. (Author)

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TEACHING ABSTRACT CONCEPTS IN SOCIOLOGY

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OCTOBER 1986

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Teaching Abstract Concepts in Sociology

ABSTRACT

Students and instructors may be frustrated with students' lack of understanding of sociological concepts. We suggest that the difficulty of teaching and learning sociology is that sociological concepts and relationships require the use of abstract reasoning patterns. Many students are unaccustomed to using these abstract reasoning patterns.

We use the Piagetian cognitive development theoretical rationale to discuss abstract thinking, offer a suggestion for measuring students' level of abstract reasoning, and provide an instructional strategy to teach abstract concepts in sociology.

Many students have difficulty comprehending abstract sociological concepts. The problem may relate to intellectual developmental theory. According to the theory the ability to deal with abstract thoughts at a purely cognitive level requires that an individual be functioning at a formal operational level (Inhelder and Piaget, 1958). Lawson (1980) found that as many as fifty percent of college students are not functioning at this level. If concepts we teach require such mental processes and we are to assist students with comprehension of abstract concepts, then we should employ instructional strategies that have been shown effective. One such strategy, based on Piaget's cognitive developmental theory, is the learning cycle approach (Karplus et al., 1980).

This paper has three purposes. First, we will discuss the theoretical basis for the learning cycle approach of teaching abstract concepts. Second, we will discuss assessing the cognitive ability levels of students. Third, we offer examples of teaching strategies based on the learning cycle approach.

The learning cycle approach emphasizes the use of concrete learning activities to aid students with comprehension of abstract concepts and processes. Although instructors often use concrete learning activities, many are not aware of any theoretical basis for their use. An overview of a relevant perspective is provided to help instructors understand relationships between concrete and abstract learning approaches.

Piaget's theory of cognitive development is the basis for the learning cycle approach. Piaget examined the cognitive functioning ability of children by developing a number of tests designed to explore their reasoning patterns. These reasoning tests involved manipulation of objects to find solutions to the problems posed. From his research he developed four stages of intellectual development: sensorimotor, preoperational, concrete opera-

tional and formal operational. Research indicates the majority of college students are functioning at the last two stages (Lawson, 1980; Thornton and Fuller, 1981). Therefore, this paper will be limited to discussing the formal and concrete operational stages.

The concrete operational stage is one in which organization of information is based on what is presented and not what is hypothetically possible. Individuals at this stage have difficulty going beyond the given data, requiring instead direct manipulation or experience with objects in order to understand relationships and make associations (Inhelder and Piaget, 1958). If students exhibit one or more of the following problems then they are probably functioning at a concrete level. (1) The student has difficulty in identifying all the variables influencing a phenomenon. (2) The student draws a conclusion upon the presentation of information without thinking of all the possible combinations of influences and the need for further data to support the conclusion. (3) "The student is not spontaneously aware of his or her own reasoning, does not check conclusions against other known data, and does not look for extreme conditions to which a theoretical conclusion could be applied easily for verification." (Karplus et al., 1980:2-5)

Students functioning at the formal operational stage are able to extrapolate beyond the data given to explore a wide range of possibilities. Abstract concepts are understood and can be applied in statements of relationships. Students are able to develop a theory and the necessary and sufficient conditions to test it. Table 1 succintly summarizes the differences in the concrete operational stage and the formal operational stage (Karplus et al., 1980:2-4).

(Table 1 about here)

Sociologists routinely use formal reasoning patterns both in their own research and in their classrooms. Students who are not functioning at the formal operational level will most likely have greater difficulty comprehending commonly used material in classroom presentations, texts, and sociological literature. To understand many of the sociological concepts, one must be able to use the formal reasoning patterns of probability, correlation, separation and control of variables, combinations, and proportions.

Proportional reasoning is the statement of relationships in mathematical form. For example, 54 percent of the U. S. population is composed of females while males comprise 46 percent of the population. There are 120 million females. How many males are in the U. S.? Separation and control of variables requires the ability to distinguish between and control for the effects of variables. For example, in designing an experiment to test obedience to authority, control variables must be identified. Probability is a statement of relationship. For example, we are 95 percent confident that the results of this study did not occur by chance. Correlational reasoning patterns require the recognition of relationships between variables, e.g., a positive association between education and income. Combinatorial logic requires the individual to understand all possible combinations of a set of given variables. For example, with a given number of variables, how many different ways can a study be designed to investigate racial discrimination?

It is often difficult to determine what and how much students understand or why they fail to grasp presented material. One of the reasons students may have difficulty understanding sociology is that it requires abstract reasoning patterns. Several paper and pencil tests for assessing reasoning levels have been developed. These tests can help instructors determine which students are having difficulty with abstract reasoning.

TOLT TEST

The Test of Logical Thinking (TOLT), designed by Capie and Tobin (1980), assesses the extent of students' formal reasoning ability with a scoring system described below. It is an easy test to administer and grade. The test requires approximately 35 minutes of class time. The reliability of the test is .79 using the coefficient alpha (Capie and Tobin, 1980). The test consists of 10 questions designed to evaluate students' reasoning abilities with ratios, control of variables, probability, correlations, and combinations. The scoring system is the following: 8-10 formal mature, 4-7 formal onset, 2-3 transitional, and 0-1 concrete. This scoring system represents a continuum between the formal operational and concrete operational stages discussed earlier.

Students scoring at the formal mature stage will have no difficulty using formal reasoning patterns consistently. Those at the formal onset stage will have a more limited ability with formal tasks. The transitional score indicates the students will sometimes be functioning at a formal mature level and other times be functioning at a concrete level depending upon the concept. Sociology students functioning at the concrete level will have great difficulty in understanding concepts requiring formal reasoning patterns.

We administered the TOLT to 259 students in lower level sociology courses in a large state university. Sixty-three percent of our students scored below the formal mature level indicating that they have some problems with formal reasoning patterns. The appendix presents a detailed discussion of this data and the results of a multiple regression analysis.

After administering the TOLT test, the instructor may find, as we did, that a large percent of the class is not at the formal reasoning stage and thus not fully prepared to easily grasp abstractions. If this occurs, the learning cycle approach is a useful instructional strategy. The learning

cycle approach is specifically designed to teach abstract concepts by the use of concrete learning activities (Karplus et al., 1980).

THE LEARNING CYCLE APPROACH

The learning cycle consists of three phases: exploration, concept introduction, and concept application (Karplus et al., 1980). In phase one, the student is given an opportunity to learn through his/her own experiences in a new situation. Minimal guidance is given during this exploration phase. After this period of exploration, the second phase of the learning cycle, concept introduction, is initiated. It is during this phase that the formal concept is introduced. The concept is defined, discussed, examples are provided, and the concept is related to the exploration activity. Phase three, concept application, allows the student to transfer the concept learned in the second phase to new settings. For concept application to occur, the learner is given additional time and experiences to expand the meaning and application of the concept. This phase is facilitated by allowing group discussion in which everyday applications are emphasized. Students may compare their different interpretations and perceptions of new related problems.

The following examples illustrate the application of the learning cycle approach to teaching basic sociological concepts. Once the approach is understood, it can be adapted to specific course and student needs.

When the concept of labelling is taught, students will need to use correlational reasoning patterns. In other words, how does a person's presentation of self correlate with others' perceptions of her/him? Probability reasoning patterns are also required to comprehend this example, i.e., based upon a particular presentation of self, what is the probability that the presentation will be accepted? In order to capitalize on the learning cycle approach the

initial introduction of the lesson should provide opportunities for exploration. One example of exploration is to have pairs of students go into an expensive department store dressed very shabbily, carrying a large bag or purse. One student is the actor, shabbily dressed, while the other student is an unobtrusive observer. Ask both students to mentally note people's responses to the actor. Students should be instructed to record their observations immediately upon leaving the store. Students should be given very little guidance or expectations for this assignment. After they have completed this exploration phase, the instructor moves to the concept introduction phase by defining and discussing the concept of labelling. The experiment provides students with a concrete example of the concept. Divergent questions should help to direct their thoughts. What were your observations about how people responded to the actor? What variables were the people responding to? How do you think people would have responded to the student actor if he/she had been dressed in very nice clothes and/or was not carrying a large bag? Were others' perceptions of the actor the same as your perception?

The concept application phase helps insure concept understanding and transfer of learning. Follow-up experiments or discussions could be used to help the concrete thinker extend the application of labelling beyond the initial experiment. A following discussion could focus on such questions as: What are examples of situations in which labelling occurs? Why do we label others? What are some other ways in which you could test the labelling process?

Another sociological example of a formal concept is proximity. This concept requires the use of the formal reasoning pattern of separation and control of variables, e.g., race, gender, and relationship between the

interactants. This concept could be introduced with an exploration phase by having students sit as closely as possible to a stranger without touching. Students should be asked to mentally note the other's reactions and later to write down their observations.

After this exploration phase is completed, move into the concept introduction phase by introducing and defining the concept of proximity. To illustrate separation and control of variables, the following questions can be asked: What was your relationship to the person whose space you invaded? Which of the distances would have been appropriate in the interaction? Did your gender and race affect the interaction? During the concept application phase, you then lead your students into discussion of additional applications and/or the design of further experiments on proximity. Such experiments might test whether there are cultural or subcultural differences in acceptable proximity.

Another example of a formal concept is inequality. Comprehension of inequality requires the use of combinatorial reasoning patterns. Most students seem to be able to grasp inequalities at a very personal level because of previous concrete experiences, but seem to have much difficulty grasping macro-level structural inequality. The exploration phase of the learning cycle in this example might require the students to visit two different grocery stores. One store should be in a wealthy neighborhood and the other in a poor neighborhood. Students are asked to write down the prices on basic staples such as milk, flour, sugar, coffee, tomatoes, lettuce, and chicken. During the concept introduction phase the concept of structural inequality is formally defined. In conjunction with the discussion, a film such as "Last Grave at Dimbaza" might be shown. This film is about South African apartheid laws and social consequences. A discussion can ensue about the obvious structural constraints to equality in South Africa and the much more subtle con-

straints in the United States, such as the grocery store price differences. During the concept application phase numerous different types of questions can be asked. For example, ask your students what other kinds of constraints there are besides the economic. This can lead into a discussion of the educational, political, or religious institutions. It also can lead into a good discussion of why "blaming the victim" will not help to change structural inequalities.

CONCLUSION

Many college students need help in understanding abstract concepts. One way of assessing whether they need help is by administering the TOLT test. If a majority of your students are not functioning at a formal mature operational level, then the course can be designed around the learning cycle approach. This approach helps students to understand abstract concepts by experience with concrete examples. Even those students who do not need as much help with abstractions may benefit by this approach because it can generate interest in the course and formal thinkers prefer concrete methods of problem solving when given a choice (Dunlap and Fazio, 1979).

Many instructors use concrete examples and experiences without realizing there is a good theoretical basis for this strategy. Understanding the Piagetian levels of cognitive development helps the instructor identify problems students have in learning abstract concepts and provides a conceptual framework for concrete learning activities. The learning cycle approach provides a three-step guide by which learning activities may be structured. Many concrete experiences fail to accomplish the instructor's goal because the instructor has only vague notions about why he/she is carrying out the activity and has little structure for the activity. The Piagetian model and the learning cycle approach helps to solve these two major problems.

The appendix presents a multiple regression analysis using demographic variables to describe students who may have problems dealing with abstractions. Although simply knowing what percent of a class needs help with abstractions is probably most useful to the individual instructor, a regression analysis is useful in describing categories of students who are most likely to need help with abstract concepts.

APPENDIX

In 1982, we administered the TOLT test to 259 students enrolled in introductory sociology or lower level family sociology courses at a large state university. The distribution of students by major demographic variables and the results of the TOLT test are presented in Table 2.

The majority of the students are male science majors. The high proportion of science majors reflects the emphasis of the university. The students are distributed fairly evenly among academic class levels with sophomores being the most numerous. Only 36.7 percent of the students scored at the formal mature level indicating that they will have no problems using formal reasoning patterns. The remaining 63.3 percent of the students will have some problems with formal reasoning patterns.

In addition to gender, class standing, and major, students were also asked to indicate their race, parental educational level and parental employment status. Multiple regression was used to assess whether a prediction model could be formulated to determine which students are most likely to have problems with formal reasoning.[1] Table 3 presents the results of the multiple regression. The full model is reported as an aid for sociologists interested in investigating additional variables.

Dummy variables representing demographic information are used in the analysis. The regression analysis indicates that gender, class standing, mother's educational level, and parental employment status significantly effects TOLT test scores. Males and seniors score significantly higher. These students probably have more experience dealing with abstractions. The regression coefficients for academic major, though not significant, are consistent with this argument. Students majoring in the sciences score higher than other majors. The negative effect of mother's college and post graduate education compared to mother's high school educational level (the omitted

category) is an unexpected finding. We speculate that the "halo" effect may be operating. This university enrolls a number of students who are the first in the family to attend college. Thus, mothers of these students may be particularly supportive of their children's educational ambitions and may have provided experiences that enhanced their abstract reasoning abilities. The most frequent level of education obtained by the mother in this sample is high school graduate. The positive relationship between mother's lack of employment and the negative relationship between father's unemployment suggests that these variables are acting as a proxy for socioeconomic status. Students with mothers who are unemployed are more likely to be from higher socioeconomic status families while students with fathers who are unemployed are more likely to be from lower socioeconomic status families. Higher socioeconomic status families have more resources to contribute to a child's education, including practice with abstract thinking (Kerckhoff, 1972).

In summary, we find that in this sample, gender, class standing, mother's educational level, and parental employment status significantly effects TOLT test scores. Females, non-science majors, students with unemployed fathers or employed mothers (which we suggest is a proxy for socioeconomic status) and younger students are most likely to have difficulty with abstract concepts.

Table 1. The Differences Between Concrete and Formal Operational Levels.*

	CONCRETE LEVEL	FORMAL LEVEL
(a)	Needs reference to familiar actions, objects, and observable properties	Reasons with concepts, indirect relationships and properties, axioms, and theories, recognizes necessary and sufficient conditions for a conclusion
(b)	Needs step-by-step instructions in a lengthy procedure	Plans a lengthy procedure given certain overall goals and resources
(c)	Is not aware of his or her own reasoning, inconsistencies among various statements, or contradictions with other known facts	Is aware and critical of his or her own reasoning; actively seeks checks on the validity of conclusions by appealing to other known information

*Table is not presented in its entirety.

Table 2. Demographic Variables and TOLT Test Scores.

GENDER		CLASS		MAJOR		TOLT SCORES	
Female	43.2%	Freshman	19.3%	Agriculture & Life Sciences	22.8%	Formal Mature	36.7%
Male	56.4%	Sophomore	35.5%	Design	2.3%	Formal Onset	42.2%
Missing	.4%	Junior	22.4%	Education	1.9%	Transitional	11.6%
		Senior	21.2%	Engineering	22.0%	Concrete	9.7%
		Other	1.5%	Forest Resources	3.5%		
		Missing	.0%	Economics & Business	19.3%		
				Humanities & Soc. Sciences	15.8%		
				Physical & Math. Sciences	8.5%		
				Textiles	9.3%		
				Missing	.0%		
Total	100.0%		100%		105.4%[a]		100.2%

[a]The 105.4% total indicates some students are indecisive, i.e., listing more than one major.

Table 3. Multiple Regression of Demographic Variables on TOLT scores.[c]

VARIABLE	Standardized Regression Coefficients
Race[a]	-.06
Gender[b]	-.16*
Class Standing	
Sophomore	.12
Junior	.15
Senior	.20*
Other	-.06
Major	
Agriculture & Life Sciences	.15
Design	-.08[d]
Education	.03[d]
Forest Resources	.25*[d]
Economics and Business	.12
Humanities & Social Sciences	-.08
Physical & Mathematical Science	.14
Textiles	.03
Father's Educational Level[e]	
Grade School	-.12
Some college	-.10
College graduate	-.14
Post-college work	-.03
Mother's Educational Level	
Grade School	-.07
Some college	-.07
College graduate	-.15*
Post-college work	-.13*
Mother's Employment Status	
Unemployed	.15*
Part-time	.03
Father's Employment Status	
Unemployed	-.17*
Part-time	-.10
	Total R^2 = .29

[a]Race coded white = 0, other = 1
[b]Gender coded male - 0, female = 1
[c]Statistical Package for the Social Sciences
[d]Very small frequencies
[e]High school is the omitted category for fathers and mothers.
*$p \leq .05$

NOTE

1. Although all the independent variables are dummy variables, the regression analysis is presented rather than an analysis of variance because we are interested in the relative contribution of each variable on the TOLT score. An analysis of variance produces approximately the same results in terms of the significant variables.

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